WOODS HOLE OCEANOGRAPHIC INSTITUTION

Reference No. 62-40

Report on ATLANTIS Cruises #280-281

June-July, 1962

WOODS HOLE, MASSACHUSETTS

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Woods Hole, Massachusetts

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Report on ATLANTIS Cruises #280-281

June-July 1962

BY

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APPROVED FOR DISTRIBUTION J. B. Hersey

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ABSTRACT

Reports on ATLANTIS Cruises 280 and 281 to the New England Seamount Chain are combined here. . A continuous bathymetric survey was run on both cruises, with profiles across several seamounts. A series of dredge and camera stations were made. They are dicussed in this report. Also included are photographs representative of each camera lowering and photographs of dredged material.

ACKNOWLEDGMENTS

Dr. J. B. Hersey, head of the Geophysics Department at Woods Hole, instigated the cruises as part of a continuing program of geological research in the North Atlantic. The work would not have succeeded without the fine cooperation of the officers and crew of the ATLANTIS. Lee Simon and Donald Carlisle were made available for the A-280 cruise through the generosity of John Reitzel.

ATLANTIS Cruises A-280 and 281 were supported entirely by contract NONR 1367 (00) with the Office of Naval Research.

INTRODUCTION

Echo sounder records have reveled the presence of a seamount chain extending south easterly some 600 miles from the continental slope off New England out into the center of the North American Basin. The purpose of ATLANTIS Cruises 280 and 281 was to gather data on a sufficient number of these seamounts so that generalizations could be made about them. Previous work on the westernmost end of the seamount chain indicated possible serpentinite on Bear Seamount and algal reef material on Mytilus Seamount. Verification of these petrographic anomalies was an important problem. Another of the interesting problems to be studied was the possible occurrence of flat topped seamounts or guyots. The study was divided into three facets: bathymetry, dredging, and bottom photography. Although limited time prevented any detailed surveys, reasonably good profiles were obtained across the summit of several seamounts (Fig. 4). It was hoped that a series of dredge and camera stations would reveal some of the geological makeup of the seamounts and shed light on the question of their origin. As a separate project on ATLANTIS Cruise 281, a series of velocimeter lowerings together with the Inverted Echo Sounder were made under the supervision of Willard Dow (Table 3).

CRUISE NARRATIVE

A-280
June 13 - 23, 1962

13 June Departed from Woods Hole at 0920 in intermittent rain and light wind.

Scientific Party and Echo Sounding (E/S) watches:

Richard Pratt, Chief Scientist	08-12
Stephen Thompson	12-16
Nicholas Gilluzzi	16-20
Donald Carlisle	20-24
William Dunkle	00-04
Lee Simon	04-08

Beam sea around Gay Head felt by all. Some instruction given on the Precision Graphic Recorder (PGR) but the sea was too rough to continue. PGR started at 1215 on a 100-fathom sweep. The rest of the day was spent securing gear as we headed for Bear Seamount.

14 June Rough weather with intermittent rain and frequent delays for fog. Everyone still a little seasick. PGR shut off for the night but started again at 0600 on 100-fathom sweep to record the continental slope. 0800 - cable was rigged up on the A-frame for dredging. A school of 8-10 blackfish sighted at 40° 03' N and 68° 05' W. Bear Seamont (Fig. 1) was crossed about noon and a broad flat top was observed. School of porpoise sighted at 1540. A turtle was also seen during the day. Entered Gulf Stream waters after supper and the fog dissipated. Crossed Retriever Seamount at 1900 and Picket Seamount at 2130 (Fig. 1).

15 June The wind slackened as the ship headed for Balanus Seamount which was crossed at 0230. At 1100-1135 a very strong scattering layer was observed between 160 and 180 fathoms. Flat, gently sloping abyssal plain noted until Kelvin Seamount was reached at 1300 and the ship stopped for Dredge Station 1. A chain bag dredge, with a canvas bag in the bottom to retain fine material was used with 2600 meters of wire. The bag came back

ripped and tangled, with pieces of manganese crust, coral and a brittle star clinging to it. On Dredge Station 2 a pipe dredge was used and 2300 meters of wire were let out. The screening on the bottom of the dredge fell out and no sample was recovered. One encouraging note - the sea calmed down and everyone ate well again. The ship steamed along the axis of Kelvin Seamount until the abyssal plain was reached at 2000. The Loran went out of adjustment at 2130 but was fixed by the radio operator. The ship steamed for San Pablo Seamount at 10 knots.

16 June About 0900 arrived on San Pablo Seamount and started with the first camera lowering at 1038. It was raining and the ship was rolling moderately to hard. The pinger stopped after an hour on the bottom and the camera was brought back up. Dredge lowering 3, 4, 5, and 6 were made from 1332 to 1917. Good hauls recovered coral, gravel, sand, and manganese nodules. Nicholas Gilluzzi took uncontaminated manganese samples, with sterile equipment, to examine them for bacteria. On Dredge Station 6 a rock 1 - 2 feet long was caught on the cable at 550 meters. The wire was damaged and had to be spliced. At 2200 repairs were finished and ship steamed back to obtain a second profile across San Pablo Seamount.

17 June Left San Pablo Seamount at 0100 and headed for the seamount charted to the east. Ship slowed during the night by thunderstorms and heavy rain. We steamed on various courses to find the other seamount. San Pablo East was finally located and the ship stopped at 0835 for Camera Station 2. 4800 meters of wire were let out. There was a very strong current to the north so that at one time the bottom dropped off faster than the camera wire could be let out.

Dredging commenced at 1530, after 3 hours were spent steaming back to the peak. On Dredge Station 7 a chain bag dredge with a pinger was used. The dredge appeared to kite so 3000 meters of wire were let out. Trouble was had in retrieving the dredge; the pinger came up OK but the bag was completely torn off. It seems that the bottom on these seamounts is too rugged for this type of dredge. A pipe dredge was used on Dredge Station 8 without a pinger but it apparently never reached the bottom. There was a strong N. E. current (3 - 4 kts.). Dredge Station 9, lowered at 2213, was made with a pipe dredge and a pinger which seemed to work very well, as coral fragments, crinoids, and brittle stars were recovered. Manganese

samples were taken by N. Gilluzzi.

At 2330 the echo sounder was turned off to repair the motor. Repairs finished at 2350 and course was set south towards Manning Seamount Group.

18 June Manning Group of seamounts reached at 0700. A rectangular survey found a minimum depth of 700 fathoms on Manning (60° 26' W). *** Camera Station 3, lowered at 1018, was a perfect run until time to bring the camera up, when a pin on the winch broke off. Winch finally repaired by engineers and camera retrieved about 1500. Pipe Dredge 10, with pinger, was lowered at 1524 and was recovered with a load of coral fragments. At 1656 Dredge Station 11 was lowered but returned empty.

The sea was choppy by this time with a good breeze from the N. W. Ship steamed toward Rehoboth Seamount Group at a speed of 8 knots. Came upon abyssal plain again at 2130.

19 June A fine clear day with calm seas. Reached Rehoboth Seamount (59° 52' W) at 0700. Camera Station 4 started at 0800. The strobe light source was not working on camera's return. Dredge Station 12 started at 1145. A pipe dredge was used and coral and manganese coated pebbles were brought up. Dredge Station 13, at 1300, brought up coral, a manganese nodule, and one small crab. Repairs were made on the echo sounder between 1545 and 1740.

The acoustic winch was tested at 1700. Ship steamed for a deep camera station at 1850. Camera Station 5 (the one deep cast of the trip) was made at 37° 41' N, 60° 00' W, at a depth of 2660 fathoms. One camera was flooded on return and the strobe was not working but the transported film indicated partial success. Both cameras were replaced.

*** A problem of nomenclature arises when one has to distinguish between the separate seamounts in a named seamount group. In lieu of names for each separate seamount, the writers feel that the best solution is to retain the name of the seamount group, and in parentheses following it place the degrees and minutes of longitude. Since no two seamount tops fall on the same meridian, this is a workable system (Fig. 3).

20 June Ship steamed across very flat abyssal plain to easternmost peak of Kelvin Banks Group. Arrived at 1030 on Kelvin Banks (62.° 08' W) and Camera Station 6 was made at 1250. Bottom dropped off steadily and the cable had to be let out continuously during the camera run.

Dredge Station 14 started to the bottom at 1203 - very poor record as EDO was not functioning properly. Had difficulty in recovering the dredge but the haul was a good one, consisting mainly of globigerina ooze. At 2030 EDO's were interchanged as one was not working. Dredge Station 15, at 2145, recovered gravel, manganese coated pebbles, and coral. Some uncontaminated manganese samples were taken by Gilluzzi.

21 June Ship steamed on a bathymetric check of other peaks in Kelvin Banks Group. At 0830 we arrived at Kelvin Banks (63° 10'). Very flat topped seamount compared to others seen thus far. Steamed over the topmost point of the flat top, as near as we could judge. Camera Station 7 was put down on a hard, reflective bottom, and the ship drifted S. E. from 890 to about 900 fms. water depth making a transect about 3/4 of the way across the flat area.

Dredge Station 16 was made at 1235 in the same area as Camera Station 7. Ship steamed on the wire but the dredge began kiting, so we stopped and just let it settle. Recovered pebbles and manganese nodules. At the end of the dredge haul the ship steamed on course 210° to the south edge of the seamount top, then at 000° to the north edge. Top proved to be nearly equidimensional with a maximum width of 3 to 4 miles.

Camera Station 8 was made at the break in slope on the north side of the seamount at 1200 fathoms. At 1745 the hydro wire broke at the winch and the camera was lost with 2347 meters of wire out. The camera was coming up under little strain. Apparently wire fatigue was responsible for the loss. With that we headed home. At 2130 the EDO failed and the echo sounding was stopped.

22 June Steamed all day, course 290 - 295°. 0800 - raised full sail in a fair wind and made between 10 and 10.5 knots. Dunkle and the radio operator looked at the EDO and got it running about 1030. All the main power tubes had gone bad. About 1200 altered course to 205° to pass over Bear Seamount. Calm sea and a gentle wind off the starboard quarter. Petrels were sighted. At 1900 we started up the continental slope. A large school of blackfish was

sighted. We were slowed down by fog which appeared intermittently during the night.

23 June It was foggy all morning but seas were calm and we made good time. The PGR was secured after continental shelf was reached and the rest of the day was spent in general clean-up. At 1500 No Man's Land was sighted. The ship docked at 1755.

CRUISE NARRATIVE

A-281
June 26 - July 1, 1962

26 June Departed Woods Hole 1530 and headed towards Bear Seamount. 1610, Fire and boat drill in Vineyard Sound.

Scientific Personnel:

Willard Dow, Chief Scientist
Richard Pratt
Stephen Stillman
Peter Clifford
John Halunen
Lee Simon
Nicholas Gilluzzi
Michael Kelly

27 June 0350 - passed Nantucket Light Vessel. Slowed by patches of fog. 1426-1735 Inverted Echo Sounding (IES) Station 1 near Bear Seamount; then crossed the seamount and obtained a profile. 1745 set sail. A stiff breeze and rough water caused a postponement of work on Bear Seamount and so we headed towards Balanus Seamount (Fig. 1).

28 June On Balanus Seamount. Dredge Station 17 and Camera Station 9. IES Station 2 in 2300 fathoms on the way towards Mytilus Seamount. Visibility excellent, ship rolling easily.

29 June Mytilus Seamount reached and Dredge Stations 18 and 19 were made, also Camera Station 10. IES Station 3 made between Mytilus Seamount and Bear Seamount and then ship steamed on to Bear Seamount for the second time. Camera Station 11 and Dredge Station 20 made late at night on Bear Seamount.

30 June 0248 secured dredging on Bear. IES 4 made just before continental rise in 1300 fathoms. Headed ship home. 1030 six to ten Sperm whales sighted, also retrieved a drifting aircraft practice bomb.

1 July Arrived Woods Hole 0530.

BATHYMETRY

Using a PGR, continuous bathymetric records were kept on ATLANTIS Cruises 280 and 281. Shortage of time prevented any detailed surveys. Nevertheless, most of the large significant seamounts out to 60° W were crossed at least once and some several times (Fig. 1, Fig. 3). The main purpose of the bathymetric study was to find out how flat-topped these seamounts are and if they show any signs of terracing. It was also hoped that when the bathymetry was integrated with the dredge and camera information, a integrated geologic picture would emerge.

Bear Seamount (39° 55' N, 67° 25' W) was crossed four times, twice on A-280 and twice on A-281 (Fig. 1). A minimum depth of 592 fathoms was recorded. This seamount has a top which conforms quite closely to Hess's (1946) typical central Pacific guyot. Its flat top varies in depth from edge to edge by approximately 10 fathoms and has gently sloping shelves (Fig. 4a). This is the only seamount in the New England Seamount chain which rises from the continental slope (Fig. 3). One profile shows a slight terrace on the southeast side of the mount.

Retriever Seamount (39° 55' N, 67° 25' W) appears to be a somewhat symetrical peak with a minimum depth of 994 fathoms (Fig. 4d). Only one profile was obtained (14 June) but it shows a shallow depression just before the seamount rises from the ocean floor. This depression is not apparent on the east side but may be lost in side echoes. This depression might indicate a sinking of the seamount as a result of isostatic adjustment.

Picket Seamount (39° 40' N, 65° 55' W) was crossed on a north-south line on 14 June. It is a symetrical peak which rises abruptly from the ocean floor. A minimum depth of 1034 fathoms was recorded.

Mytilus Seamount (39° 20' N, 67° 10' W) was crossed on 29 June but poor records do not give a clear profile. It can be seen, however, that the top has a strongly reflecting surface. A minimum depth of 1040 fathoms was recorded.

Balanus Seamount (29° 25' N, 65° 25' W) was passed over on 15 June and 28 June (Fig. 1). Earlier profiles had shown the seamount to be a fairly large, assymetrical peak. The record obtained on ATLANTIS Cruise 280, however, shows that this is a dual-peaked seamount, with one peak at 780 fathoms and

the other at 945 fathoms (Fig. 4b). A detailed bathymetric survey might prove fruitful as there are no other dual-peaked seamounts in the area.

Kelvin Seamount (38° 50' N, 64° 50' W) is the largest single seamount discussed here, being some 35 nautical miles across (Fig 3). This seamount was crossed on 15 June and again on 21 June. It has three interconnected, nearly flat summits which decrease in height towards the east (Fig. 4c). A minimum depth of 852 fathoms was recorded.

San Pablo Seamount (38° 55' N, 61° 00' W) was passed over on 16 June. It has a very flat top and shows prominent terracing extending some 80 fathoms below the top (Fig. 4a). Several profiles were made and they were all quite similar. A minimum depth of 488 fathoms was recorded. This was the shallowest depth found on the New England Seamount Chain during either cruise (Fig. 3).

San Pablo East Seamount (39° 55' N, 60° 30' W) was investigated on 17 June and appears to have a rounded top with fairly rugged topography (Fig. 4c). The contacts between the seamount slope and the ocean floor are, for the most part, indistinct, though one profile does show a depression at the base. A minimum depth of 720 fathoms was recorded.

Manning Seamount Group was reached on 18 June, and Manning (60° 26' W) was investigated. This seamount has a small rounded peak and emerges abruptly from the abyssal plain. The minimum depth recorded was 700 fathoms (Fig. 4c).

Rehoboth Seamount Group was investigated on 19 June. Rehoboth (60° 06' W) was passed over first. This seamount rises abruptly from the abyssal plain and reaches a peak at 1785 fathoms. It then trails off into a series of bumps and it is quite possible that it is a spur of Rehoboth (59° 52' W). This seamount has a fairly flat top with some evidence of terracing and the break to to the abyssal plain has no evidence of a basal depression. The minimum depth recorded was 665 fathoms (Fig. 4a).

Kelvin Banks Seamount Group was reached on 20 June (Fig. 3). The easternmost seamount, Kelvin Banks (62° 08' W) is a flat-topped mount with evidence of small terrace-like features. A minimum depth of 770 fathoms was recorded (Fig. 4b). Kelvin Banks (62° 30' W) with a recorded depth of 917 fathoms was passed over on 21 June (Fig. 4d). This is a symetrical peak

which emerges somewhat gradually from the bottom. A similar peak at 1022 fathoms, Kelvin Banks (62° 52' W) was passed over shortly thereafter (Fig. 4d). The most spectacular seamount of this group is Kelvin Banks (63° 10' W) which has a flat top 3 to 4 miles wide. This top is fairly equidimensional and has a minimum depth of 877 fathoms (Fig. 4d). The top slopes off gradually to the steep break in slope and shows no evidence of terracing.

DREDGING

Using both chain bag dredges and pipe dredges, twenty dredge hauls were made on A-280 and 281 (Fig. 2). The chain bag dredge was fitted with a canvas sack to trap fine sediments and weighted to keep the bag on the bottom. This type of dredge was used twice and on both lowerings the bag returned ripped, the second time it being torn completely off. These dredges are not well suited for the topography which was encountered as the risk in getting snagged on the bottom is too great which results in the loss of both dredge and wire. A 12"-pipe dredge was found to be most efficient and after the first lowering, in which the screening fell out, 15 out of 17 lowerings were successful. On six lowering an Edgerton ring pinger was placed 100 meters above the dredge to tell when the dredge was on bottom. This method proved highly efficient as every such haul was successful, several times bringing up full dredges of material. A tabulation and general description of the dredge stations can be found in Table II. A more detailed analysis follows:

Dredge 1 - One brittle star, two living corals (Fig. 5) and one thick (3" by 5") manganese crust.

Dredge 2 - No sample.

Dredge 3 - Predonimantly dead coral. Species which were recognized are:

1. Madrepora oculata
2. Lophelia prolifera
3. Enallopsammia rostrata (alive)

One annelid worm (polychaete) was also found. One 4" piece of very hard manganese coated foraminiferal limestone, which probably formed on the seamount was recovered.

Dredge 4 - Several rounded and well worn pebbles and occasional manganese crusts. The pebbles have a thin manganese coating.

Dredge 5 - A large amount of gravel made up of broken coral fragments, with manganese-coated ice rafted pebbles dispersed throughout.

Dredge 6 - Broken, dead coral of assorted sizes.

1. Many fragments of Madrepora oculata
2. Occasional Desmophyllum crestigalli

3. Occasional Lophelia prolifera

Several small to medium-sized glacial pebbles were also present. Some crinoids and small pelcypod shells (Fig. 6).

Dredge 7 - No sample.

Dredge 8 - No sample.

Dredge 9 - A few coral fragments (Madrepora oculata, Dendrophyllia sp.), several manganese nodules and two brittle stars.

Dredge 10 - Broken, dead coral.

1. Desmophyllum crestigalli
2. Madrepora oculata
3. Lophelia prolifera

A few manganese coated pebbles and manganese crusts were present as were several hydrozoans.

Dredge 11 - No sample.

Dredge 12 - Several large coral fragments:

1. Madrepora oculata
2. Lophelia prolifera

Also present were hydrozoans.

Dredge 13 - Broken, dead coral, (Isid Octo coral), small deep-sea crab (Fig. 5) and one crinoid (Antedon sp.).

Dredge 14 - Calcareous ooze containing coral fragments:

1. Desmophyllum crestigalli
2. Lophelia prolifera

Also contained several compacted calcareous ooze fragments, very much like chalk in physical aspect, imbedded in tenacious calcareous mud.

Dredge 15 - Fragments of the coral Lophelia prolifera , glacially rounded pebbles and a few manganese crusts.

Dredge 16 - Manganese coated, well rounded rocks of varying size, probably glacially deposited (Fig. 7). The rocks are vairly evenly distributed amoung igneous, metamorphic and sedimentary provinces, consisting of the following:

1. Igneous
    a. granite
    b. diorite
    c. gabbro
2. Metamorphic
    a. gneiss
    b. schists
    c. various metasediments
3. Sedimentary
    a. shales
    b. sandstones
    c. limestones

Indurated calcareous ooze with a manganese coating is of probable local derivation. The rock is in the form of ripple-mark-like structure in some specimens. Similar indurated calcareous ooze was described in the Pacific by Hamilton (1956, p. 34). Coral fragments (Enallopsammia rostrata) are also present.

Dredge 17 - Globigerina sand with small pebbles and hydrozoan fragments scattered through it. Also present were living coral and two brittle stars. Size analysis of the sand indicates very good sorting--similar to that of some beach sand.

Dredge 18 - A handfull of small, glacially rounded pebbles.

Dredge 19 - Several small pebbles and one cobble--well rounded and probably of glacial origin. One 3" clinker of light gray, laminated ash with an unburnt coal center--probably dropped from a passing ship.

Dredge 20 - Gravelly sand with several large glacial pebbles and one living Sipunculid.

PHOTOGRAPHY

Eleven camera lowerings were made with two Edgerton deep-sea (CA-9) cameras mounted on a stereo rig with sonal transducer (Fig. 2). One camera was fitted with an f-11 lens and the other with an f-4.5 lens. A reflector was used in conjunction with the LS-9 strobe light source on the first station but was not attached on subsequent stations. All lowerings were made on standard hydrographic wire. The stereo camera rig and 2347 meters of wire were lost on Camera Station 8. The f-4.5 film on Camera Station 11 failed to transport the film and on station 5 one camera was flooded. The only other difficulties experienced were on Camera Stations 4 and 5, where the light source failed after some 90 exposures. It was hoped that some correlation could be made between the photographs and dredge material, although it is realized that pictures are seldom obtained of the area sampled. It can be assumed that the fauna and geology of any one seamount are fairly uniform at similar depths and in practice dredged material is easily identified in photographs. A tabulation of the camera lowerings can be found in Table I and representative pictures from each lowering are seen in Figs. 8 through 25. The sequence of pictures are plotted against time and depth and from this a reasonably accurate picture of the bottom on the camera track profile can be interpreted. Such an interpretation of each of the ten successful lowerings follows:

Camera Station 1 - San Pablo Seamount - 520-670 fathoms

This lowering was taken down the side of the seamount. The first photographs show gravel (Fig. 8) and sand (one with a long-tailed, deep-water fish). The gravel is made up of coral fragments with occasional brittle stars on top of it. As the camera progresses downslope manganese coated boulders are noted which grade into ledges of rock with sand and gravel in the interstices (Fig. 9). The final two-thirds of the lowering consist of sand and gravel made up of dead coral fragments as in the beginning. This correlates very well with the material that was brought up on Dredge Stations 3, 4, 5, and 6.

Camera Station 2 - SanPablo Seamount East - 1500-2050 fathoms.

The bottom in this series of photographs consists predominantly of manganese coated boulders, cobbles and pebbles (Fig. 10). Several areas of bare, well rounded "bedrock" (Fig. 11) were photographed to which some small branching corals (dendrophyllids ?) are attached. Gravel and sand begin to appear towards the end of the run and one of the last pictures shows several small boulders surrounded by rippled sand. Dredge Stations 7 and 8

in this area failed to recover a sample undoubtedly due to the rugged terrain. The other lowering, Dredge Station 9, brought up dead coral, manganese nodules, and brittle stars.

Camera Station 3 - Manning Seamount Group - 870-810 fathoms.

The camera moved along a fairly flat bottom at first and photographed ripple-marked sand and gravel, with an occasional rock and a medium sized, dark colored fish (Fig. 12). As the camera moved upslope, the ripple marks disappeared and coral fragments became more predominant. When the slope leveled off again the bottom was made up entirely of coral fragments with worm tracks, and brittle stars (Fig. 13). Dredging in the Manning Seamount Group brought up gravel made up of dead coral fragments.

Camera Station 4 - Rehoboth Seamount Group - 670-930 fathoms.

Only one-fourth of the film had any pictures because the light source failed on the bottom. This section of the run was on a flat bottom consisting mainly of pelagic sand and gravel grading into manganese coated boulders (Fig. 14). Dredge hauls brought up dead coral fragments and manganese coated pebbles.

Camera Station 5 - Abyssal Plain - 2600-2660 fathoms.

The light source on this lowering failed also and again only one-fourth of the film had pictures. These few pictures are quite interesting, however, as they show a hummocky, rounded surface which seems to be composed entirely of manganese (Fig. 15). Occasional sandy areas appear and in one photograph small boulders are seen in depressions indicating possible bottom current action (Fig. 16). No deep dredge hauls were made.

Camera Station 6 - Kelvin Banks Seamount Group - 850-1250 fathoms.

This lowering was by far the most successful of the series and a set of excellent prints were obtained. Generally the bottom grades from a boulder strewn area to gravel and then to bare rock at the break in slope. Going down slope the bare rock grades back into gravel with occasional boulders. In several photographs, there appears to be manganese coated ripple marks covering the bottom (Fig. 17). These were very similar in appearance to the indurated manganese coated calcareous (globigerina) ooze that was dredged in the area. Although these fragments were covered with manganese on all sides it is possible that slumping had freed the other surfaces and had also made the fragments more accessible to the dredge. Several living deep-sea corals were identified as follows:

1. Large branching stony corals
2. Long spiral gorgonians of the genus Narella
3. Large, branching enallopsammid corals
4. Several pennatulid alcyonarians of the genus Anthoptilum. (The bottom around these corals seemed to be strewn with their dead, broken stems)

The gravel surface, made up of broken coral fragements, and numerous types of sponges were noted but not identified (Fig. 18).

Camera Station 7 - Kelvin Banks Seamount Group - 880-910 fathoms.

This station was on the flat top of Kelvin (63° 10' W) and the photographs show a bottom which grades from sand and gravel to sand and gravel with cobbles and occasional boulders (Fig. 19). Worm trails, starfish, and crinoids are evident throughout the camera run. Dredge Station 16, in this vicinity, brought up well rounded manganese coated pebbles and nodules.

Camera Station 9 - Balanus Seamount - 790-1060 fathoms.

This run was all downslope and shows a sand and gravel bottom grading into a gravel and boulder terrain (Fig. 20). Starfish, worm trails, and crinoids are abundant. One photograph shows a spiral gorgonian and an antipatharian (Fig. 21), while another photograph shows an unidentified deep-sea fish. Globigerina sand and gravel was recovered on Dredge Station 17.

Camera Station 10 - Mytilus Seamount - 1370-1380 fathoms.

Sand and gravel predominate on a flat bottom and seem to stream around any obstruction, which may indicate strong currents. This type of bottom grades into ripple marked sand (Fig. 22) and then abruptly near the end of the lowering into boulders and bedrock. The camera remained stationary at one spot and successive pictures show a starfish falling and a solitary coral moving with the current (Fig. 23). Only a meager number of pebbles were dredged from this area on Dredge Stations 18 and 19.

Camera Station 11 - Bear Seamount - 650-770 fathoms.

This lowering was downslope and consists entirely of sand and gravel with occasional cobbles (Fig. 24). Worm trails and starfish appear in several frames (Fig. 25) and two photographs show a sinuous eel-like fish. Dredge Station 20 brought up half a dredge full of sand and gravel.

CONCLUSION

ATLANTIS Cruises A-280 and A-281 succeeded advancing our understanding of the New England Seamounts although no startling new discoveries were made. Dredging failed to verify the existence of serpentinite on Bear Seamount or shallow water reef material on Mytilus Seamount; instead the almost complete cover of ice rafted glacial material made dredging difficult and identification of rock in place doubtful..

Most of the seamounts have a well-defined top with a minimum depth centered on a relatively flat surface, best exemplified by Kelvin Banks (63° 10' W). The question as to whether or not these flat topped peaks are guyots is still unanswered, pending precise surveys and the dredging of definite shallow water faunas. The environmental influence of the Gulf Stream on some of the outer seamounts is readily apparent from the photographs and dredged material. The wide spread occurrance of coral and pelagic ooze is reminescent of conditions on the Blake Plateau (Studied last year on A-266 (Stetson, 1961)). The wide spread encrustations of manganese are probably indicative of non-depositional conditions under the Gulf Stream.

The seamounts, as a whole, are charted within the accuracy of the navigation used. Future work should incorporate the use of navigation bouys planted on the individual peaks, especially to assertain the possible assymetry of the seamounts under Gulf Stream influence; along this line, it would be interesting to take bottom current measurments on top of some of the seamounts. Deep dredging on the steep sides will probably yield primary hard rock material. Certainly the photographs near the top of various seamounts indicate much more massive rock than the dredges recovered, but much of this might be manganese encrustations. The most important factor for the successful completion of future work is to allow enough time to complete an integrated program of study on individual seamounts, including work on the sides as well as the tops.

REFERENCES CITED

Hamilton, Edwin (1956) Sunken Islands of the Mid-Pacific Mountains. Geol. Soc. Amer. Mem. 64, 97 pp.

Hess, H. H. (1946) Drowned Ancient Islands in the Pacific Basin. Amer. Jour. Sci. Vol. 244 pp. 772-791

Northrop, J. et al (1962) Bermuda--New England Seamount Arc. Geol. Soc. Amer. Bull. Vol. 73 pp. 587-594

Stetson, T. R. (1961) Report on ATLANTIS Cruise 266, June-July 1961, W. H. O. I., Reference No. 61-35 24 pp. Unpublished.

TABLE I

EDGERTON CAMERA LOWERINGS

Number	Date	Time	Lat. (N)	Long. (W)	Depth(fms.)	Remarks
A-280						
1	6/16	1038 1215	38°58.7' 38°59.5'	60°59.5' 60°58.0'	570-670	On San Pablo Seamount along break in slope. Reflector used on the light source.
2	6/17	0934 1200	38°50' 39°01.5'	60°24.5' 60°25.0'	1500-2050	On San Pablo East, down the slope. Reflector taken off. Ship steams at intervals.
3	6/18	1018 1400	38°12.3' 38°16.0'	60°29' 60°29.5'	810-870	In Manning Group. Repairs made to winch as camera is brought back.
4	6/19	0800 1035	37°29' 37°31'	59°49.5' 59°51.0'	670-930	On Rehoboth Seamount along break in slope. Light source fails after 90 exposures.
5	6/19	2010 2315	37°37.5' 37°41.0'	59°58' 60°00'	2600-2660	On Abyssal Plain. One camera flooded. Light source fails after 90 exposures.
6	6/20	1249 1525	37°58' 37°58'	62°09' 62°08'	850-1250	In Kelvin Banks Group. Continually downslope.
7	6/21	0937 1153	38°31' 38°30'	63°14.4' 63°11.0'	890-900	On flat topped seamount in Kelvin Banks Group. Hard reflective bottom.

TABLE I (CONTINUED)

EDGERTON CAMERA LOWERINGS

Number	Date	Time	Lat. (N)	Long. (W)	Depth (fms.)	Remarks
8	6/21	1630 -	38°34.8' 38°33.5'	63°13' 63°13'	-	Cable parted at 2346 meters. Camera lost.
A-281 9	6/28	1253 1516	39°28.8' 39°24.0'	65°23' 65°25'	790-1010	On Balanus Seamount, down the slope.
10	6/29	0545 0830	39°21' 39°21'	67°03.5' 67°05.5'	1370-1390	Near top of Mytilus Seamount. One leg of the rig is bent on return.
11	6/29 6/30	2220 0046	39°53.5' 39°52.5'	67°28' 67°29'	650-780	On Bear Seamount along break in slope. Ship steams on wire. Left camera (f. 4.5) fails to transport film.

TABLE II

Dredge Stations

Sta. #	Date 1962	Time	Lat. (N)	Long. (W)	Depth (fms.)	Type	Remarks
A-280							
1	6/15	1327	38°49'	64°09'	900	Chain	On Kelvin Seamount. Bag ripped. Coral (living), brittle star and one manganese nodule.
		1519	38°48'	64°06'	860	Bag	
2	6/15	1547	38°49'	64°09'	862	Pipe	Screening fell out. No sample.
		1700	38°48.5'	64°03.5'	852		
3	6/16	1332	38°54'	61°01'	872	Pipe	San Pablo Seamount. Broken coral (1 sack).
		1452	-	-	642		
4	6/16	1529	38°55'	60°58.5'	625	Pipe	On San Pablo Seamount Handful of rock fragments and pebbles.
		1627	38°58'	60°57.5'	564		
5	6/16	1647	38°55'	60°58.5'	557	Pipe	Coral sand and gravel (2 sacks).
		1748	-	-	507		
6	6/16	1813	38°58'	60°57.5'	506	Pipe	San Pablo Seamount. Coral sand and gravel (2 sacks - 1 washed). Original mud (1 jar).
		1917	-	-	503		
7	6/17	1530	38°49.5'	60°29.5'	1400	Chain	Bag lost. No sample.
		1825	-	-	1049	Bag	
8	6/17	1945	-	-	1039	Pipe	Bottom never reached. No sample.
		2055	38°52'	60°30'	978		
9	6/17	2213	38°51.3'	60°29'	1040	Pipe	On San Pablo East. Coral, manganese nodules, brittle stars and crinoids.
		2309	38°53.0'	60°30'	-		
10	6/18	1525	38°11.5'	60°25.5'	1000	Pipe	In Manning Group. Coral gravel and manganese coated pebbles (4 sacks).
		-	-	-	-		
11	6/18	1656	38°14.5'	60°27'	925	Pipe	No sample.
		1919	38°13.8'	60°26'	-		

TABLE II (CONTINUED)

Dredge Stations

Sta. #	Date 1962	Time	Lat. (N)	Long. (W)	Depth (fms.)	Type	Remarks
12	6/19	1145	37°28.5'	59°47.5'	800	Pipe	On Rehoboth Seamount
		1253	37°29.0'	59°47.0'	680		Coral and manganese coated pebbles.
13	6/19	1310	37°32.5'	59°48'	670	Pipe	Rehoboth Seamount.
		1405	-	-	-		Coral, manganese nodules and one small crab.
14	6/20	1703	38°04'	62°09.8'	1400	Pipe	In Kelvin Banks Seamount Group. Globigerina ooze and coral (3 jars, 2 sacks - one washed)
		1950	38°02'	62°08.0'	1040		
15	6/20	2138	-	-	785	Pipe	Kelvin Banks. Coral gravel and manganese coated pebbles.
		2315	38°04'	62°08'	-		
16	6/21	1235	38°30.5'	63°13'	900	Pipe	Kelvin Banks. Pebbles and manganese nudules.
		1420	38°20.0'	63°12'	909		
A-281 17	6/28	1050	39°25'	65°26.2'	790	Pipe	On Balanus Seamount.
		1215	39°25.2'	65°26.2'	980		Sand and gravel (3 sacks and 1 jar).
18	6/29	0916	39°22'	67°10'	1310	Pipe	On Mytilus Seamount.
		1055	39°23'	67°11'	1340		Handfull of pebbles.
19	6/29	1120	-	-	1325	Pipe	Mytilus. Couple of handfuls of pebbles.
		1330	39°23'	67°11'	1295		
20	6/30	0059	39°52.5'	67°29'	685	Pipe	On Bear Seamount.
		0304	39°53.0'	67°39.5'	670		Half a dredge of sand and gravel.

TABLE III

Inverted Echo Sounder Stations

Sta. #	Date	Time	Lat. (N)	Long. (W)	Depth (fms.)
1	6/27	1426 1735	39°52.5'	67°28'	1550
2	6/28	1735 2130	39°18.3'	65°48.2'	2370
3	6/29	1920 1905	39°28.5'	67°27'	1800
4	6/30	0755 0957	39°53'	68°53'	1360

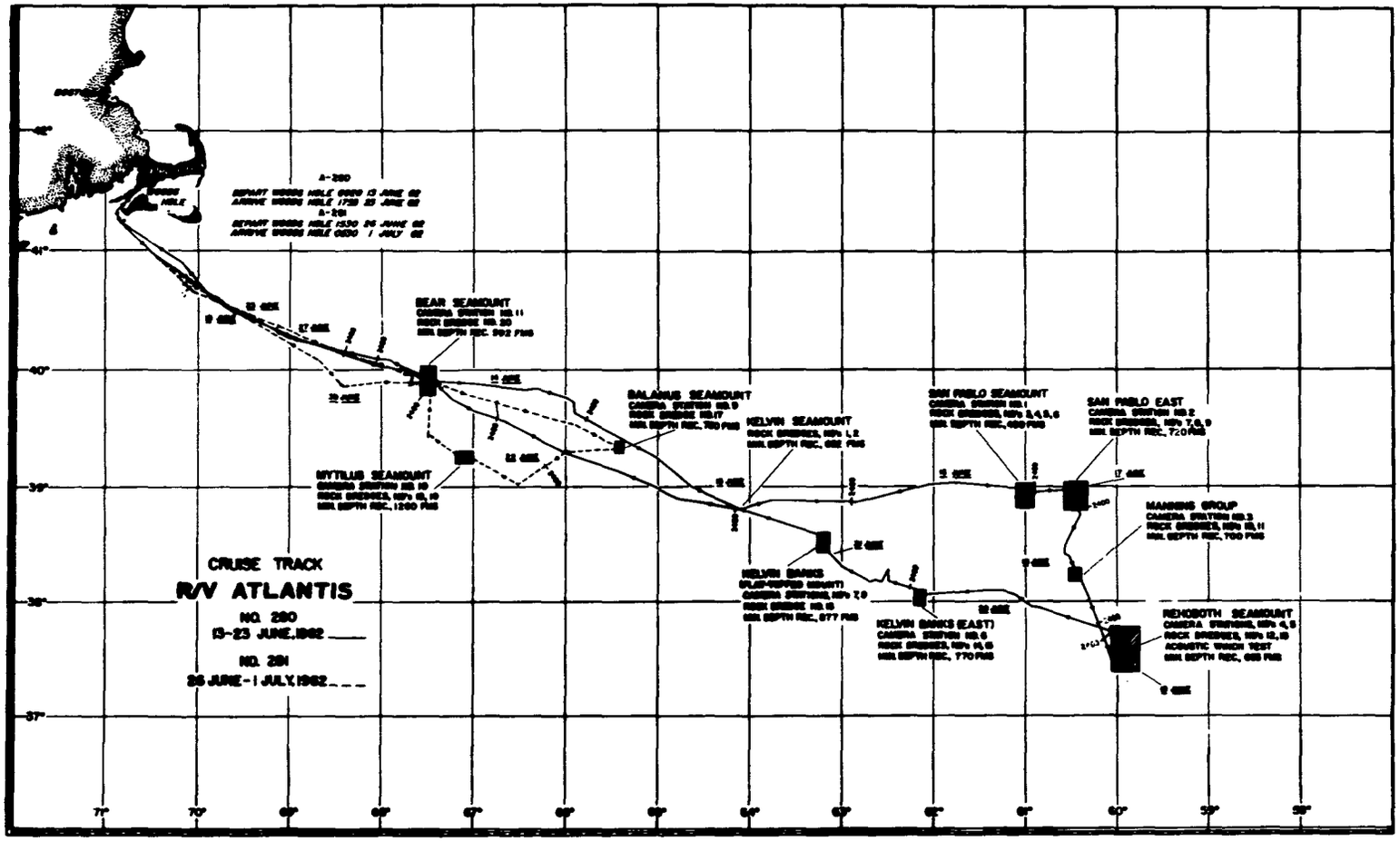

A-280
A-281
BEAR SEAMOUNT
MYTILUS SEAMOUNT
BALANUS SEAMOUNT
KELVIN SEAMOUNT
KELVIN BANKS
KELVIN BANKS (EAST)
SAN PABLO SEAMOUNT
SAN PABLO EAST
MANNING GROUP
REMOBOTH SEAMOUNT
CRUISE TRACK
R/V ATLANTIS
NO. 280
13-23 JUNE, 1962
NO. 281
26 JUNE - 1 JULY, 1962
40°
39°
38°
37°
71°
70°
69°
68°
67°
66°
65°
64°
63°
62°
61°
60°
59°

FIGURE 1.

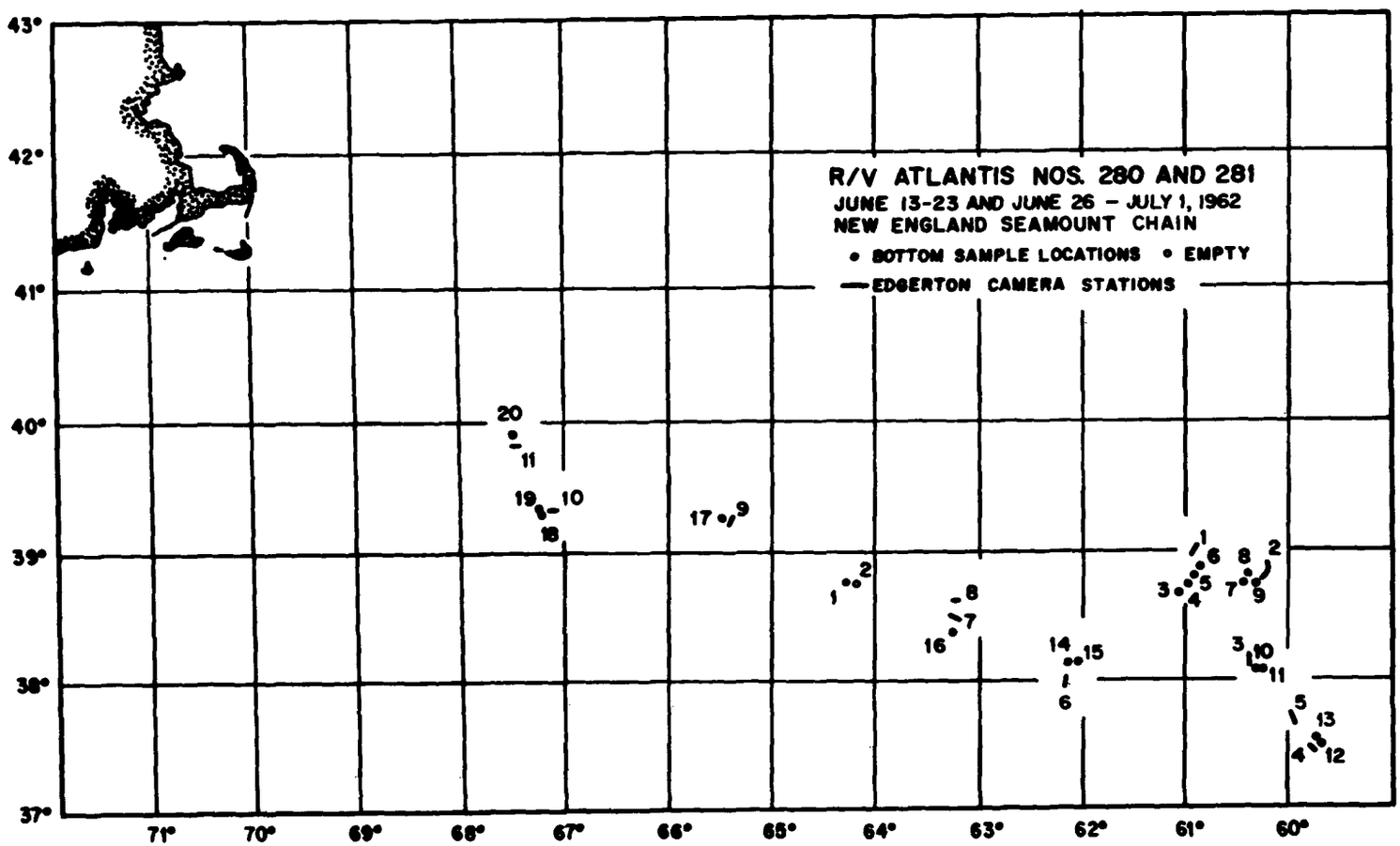

R/V ATLANTIS NOS. 280 AND 281
JUNE 13-23 AND JUNE 26 – JULY 1, 1962
NEW ENGLAND SEAMOUNT CHAIN
• BOTTOM SAMPLE LOCATIONS • EMPTY
—EDGERTON CAMERA STATIONS
43°
42°
41°
40°
39°
38°
37°
71°
70°
69°
68°
67°
66°
65°
64°
63°
62°
61°
60°

FIGURE II.

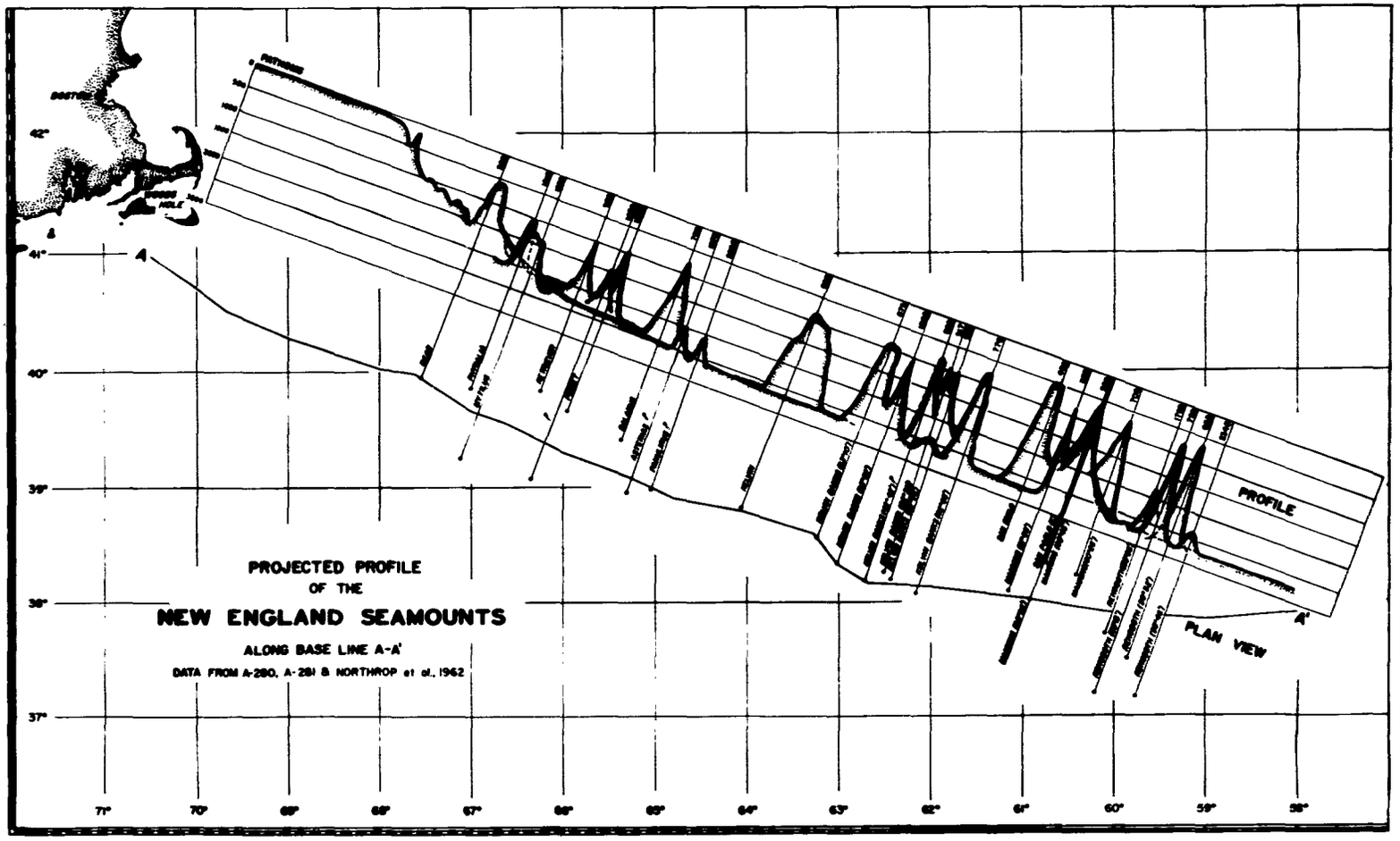

PROJECTED PROFILE
OF THE
NEW ENGLAND SEAMOUNTS
ALONG BASE LINE A-A'
DATA FROM A-280, A-281 & NORTHROP et al., 1962
PROFILE
PLAN VIEW
A
A'
42°
41°
40°
39°
38°
37°
71°
70°
69°
68°
67°
66°
65°
64°
63°
62°
61°
60°
59°
58°

FIGURE III

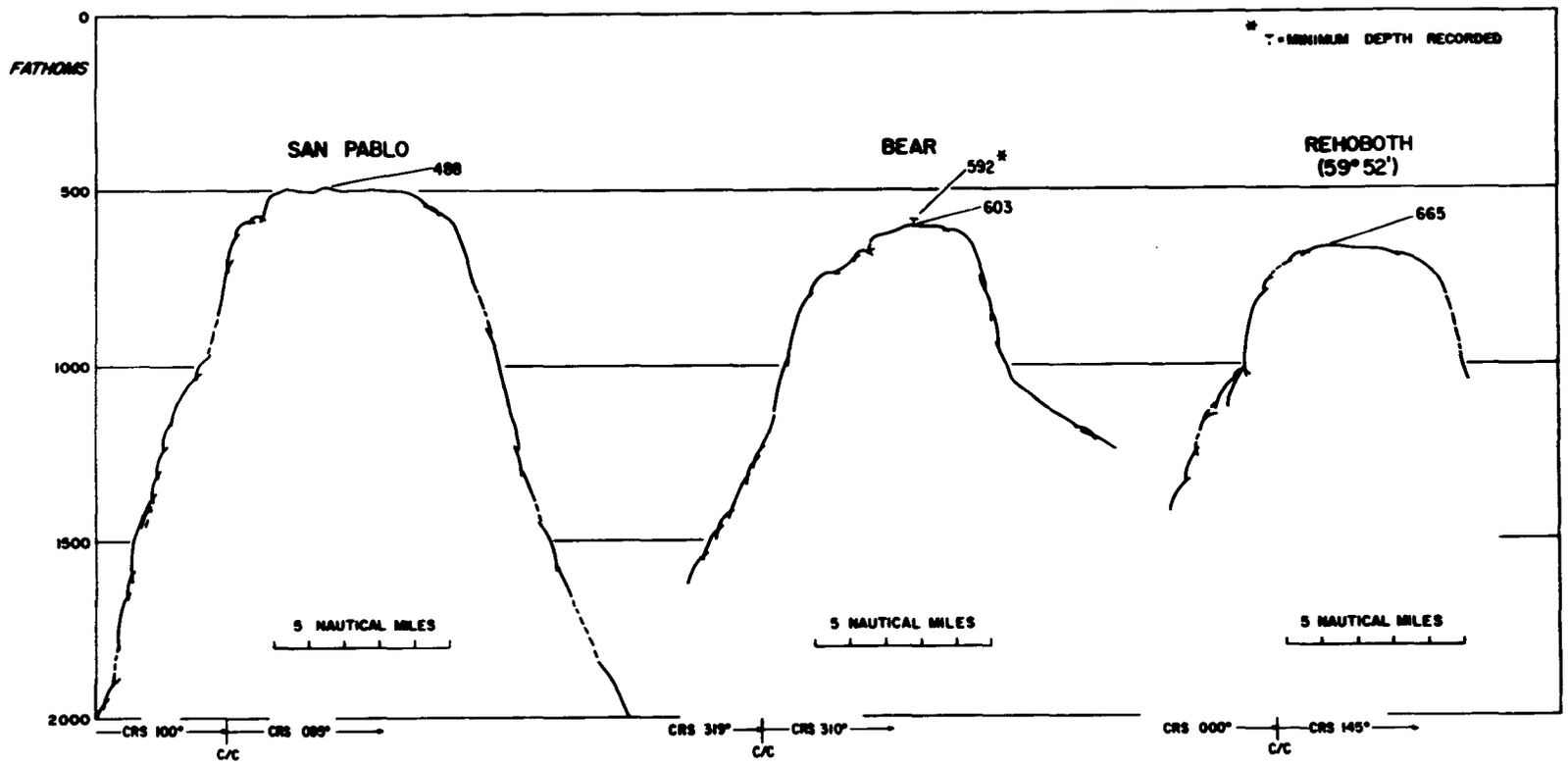

0
FATHOMS
500
1000
1500
2000
* = MINIMUM DEPTH RECORDED
SAN PABLO
488
BEAR
592*
603
REHOBOTH
(59° 52')
665
5 NAUTICAL MILES
5 NAUTICAL MILES
5 NAUTICAL MILES
CRS 100°
CRS 089°
C/C
CRS 319°
CRS 310°
C/C
CRS 000°
CRS 145°
C/C

FIGURE IVa.

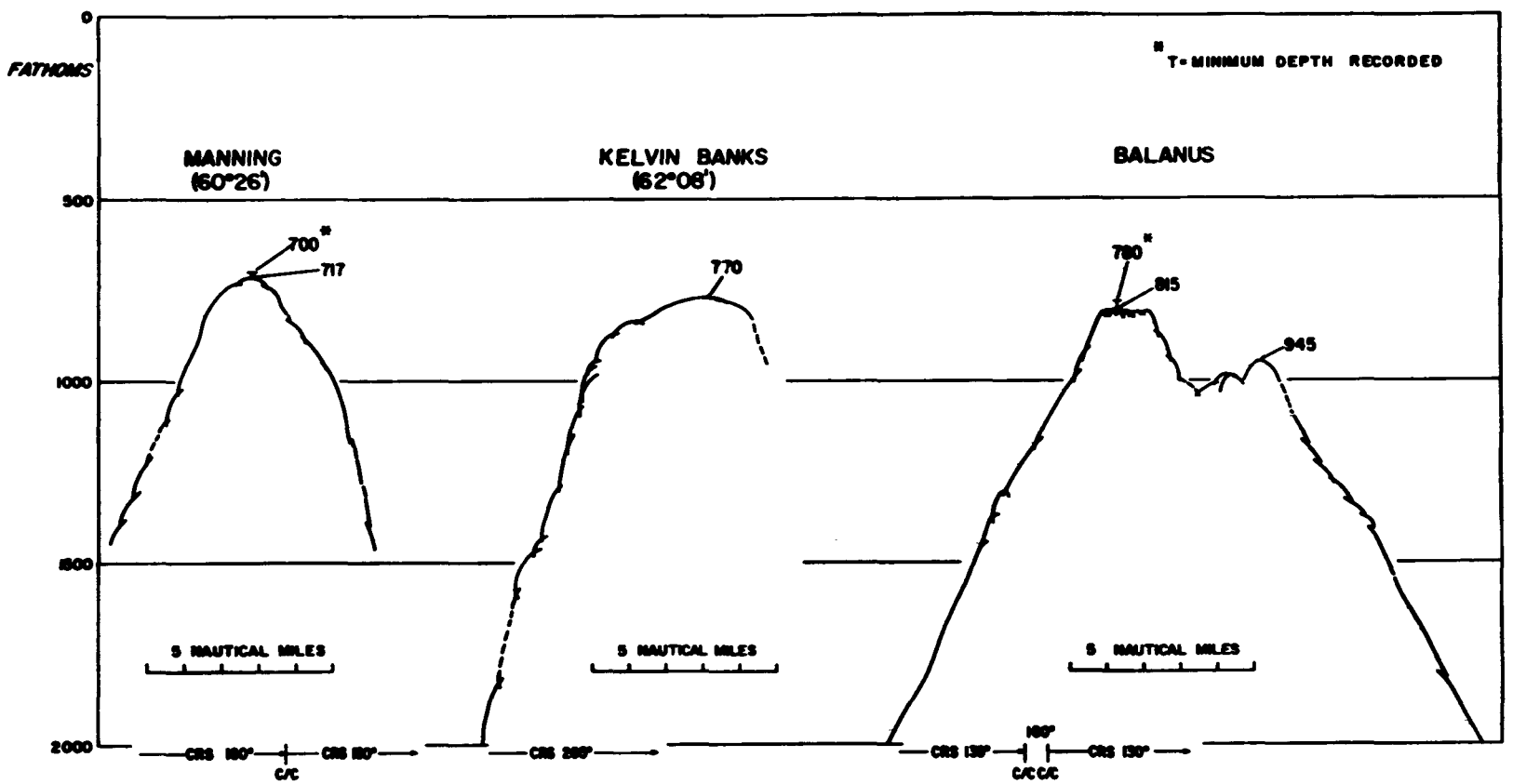

0
FATHOMS
* T= MINIMUM DEPTH RECORDED
MANNING
(60°26')
KELVIN BANKS
(62°08')
BALANUS
500
700*
717
770
780*
815
945
1000
1500
2000
5 NAUTICAL MILES
5 NAUTICAL MILES
5 NAUTICAL MILES
CRS 180°
CRS 180°
C/C
CRS 280°
CRS 130°
100'
C/C C/C
CRS 130°

FIGURE IVb.

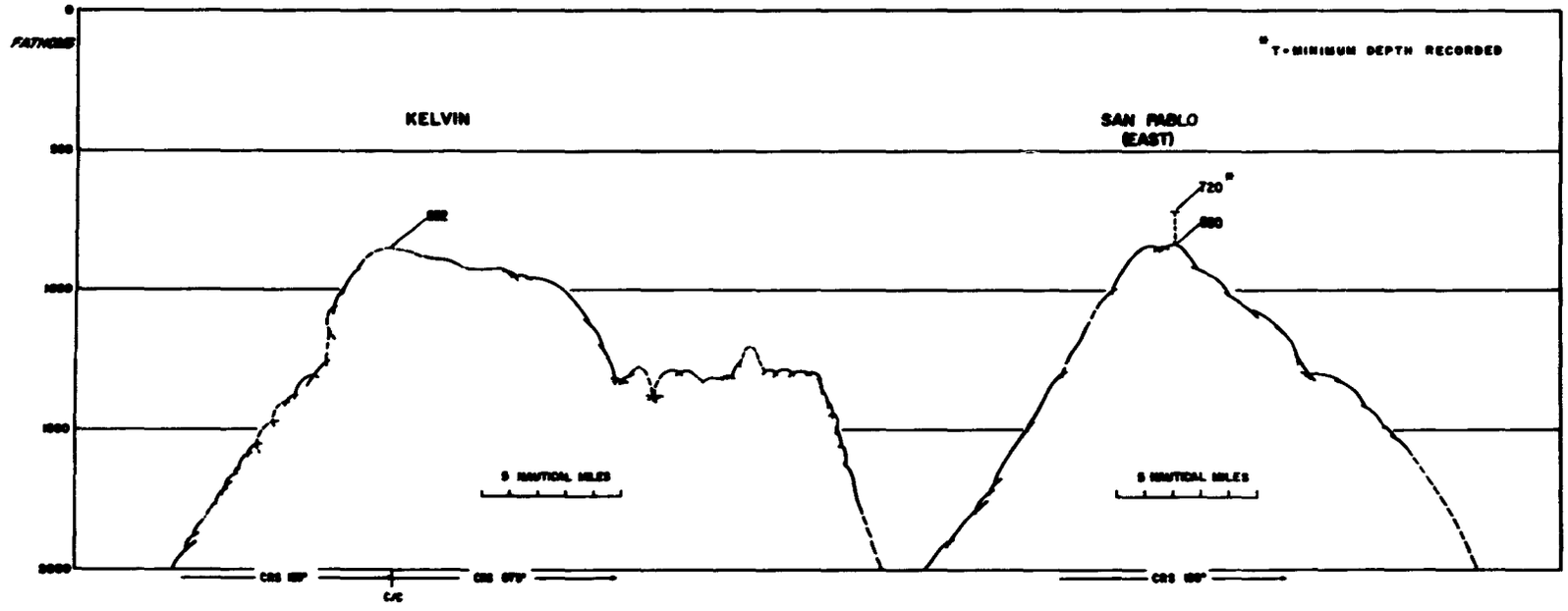

KELVIN
SAN PABLO
(EAST)
T - MINIMUM DEPTH RECORDED
720*
5 NAUTICAL MILES
5 NAUTICAL MILES

FIGURE IVc.

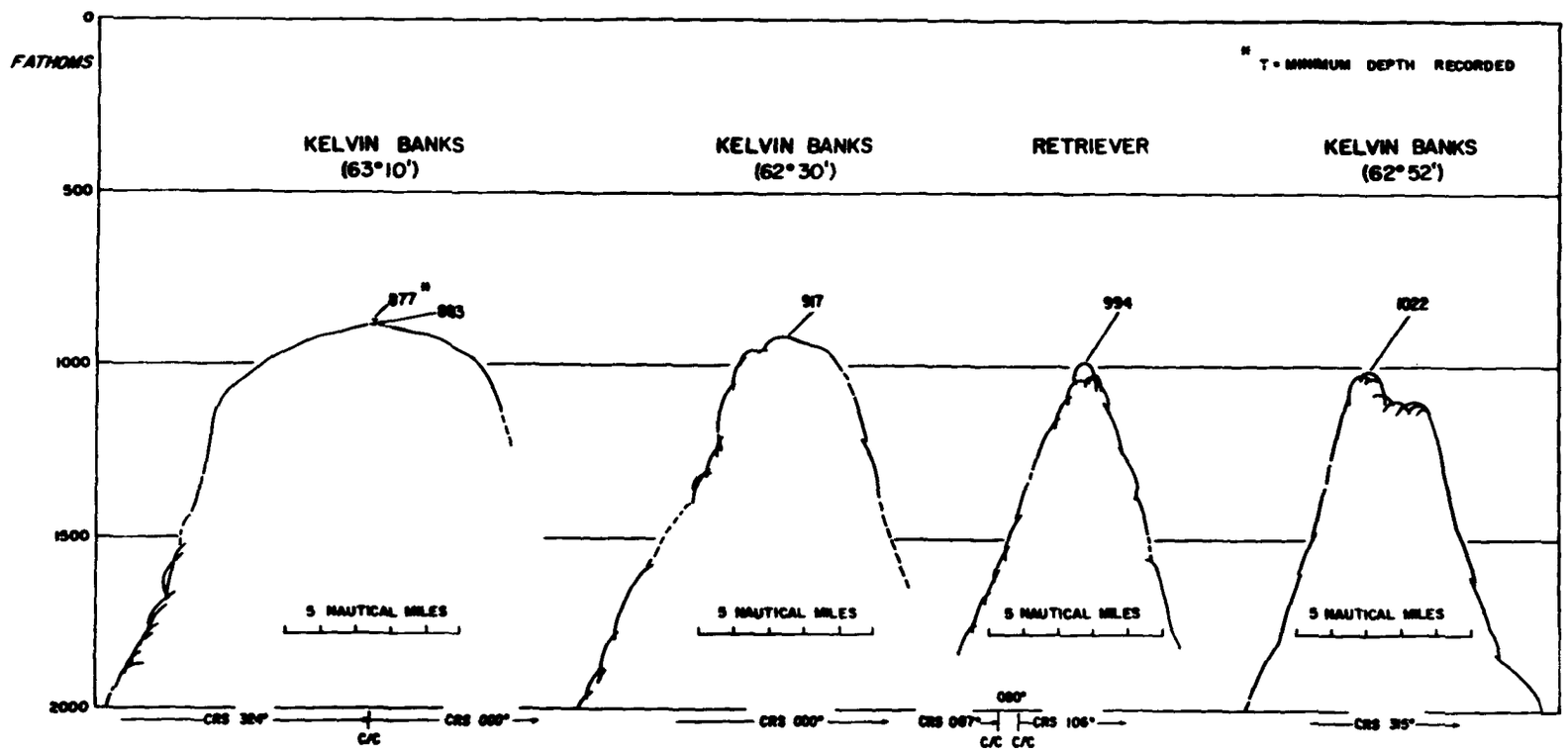
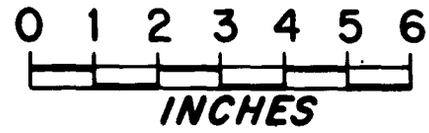

FATHOMS
0
500
1000
1500
2000
* T = MINIMUM DEPTH RECORDED
KELVIN BANKS (63°10')
KELVIN BANKS (62°30')
RETRIEVER
KELVIN BANKS (62°52')
877 *
883
917
994
1022
5 NAUTICAL MILES
5 NAUTICAL MILES
5 NAUTICAL MILES
5 NAUTICAL MILES
CRS 324°
C/C
CRS 060°
CRS 060°
080°
CRS 067°
CRS 106°
C/C C/C
CRS 315°

FIGURE IVd.

R.D.*1

BRITTLE STAR

CORAL



P.D.*17 CORAL

P.D.*13 CRAB

FIGURE V.

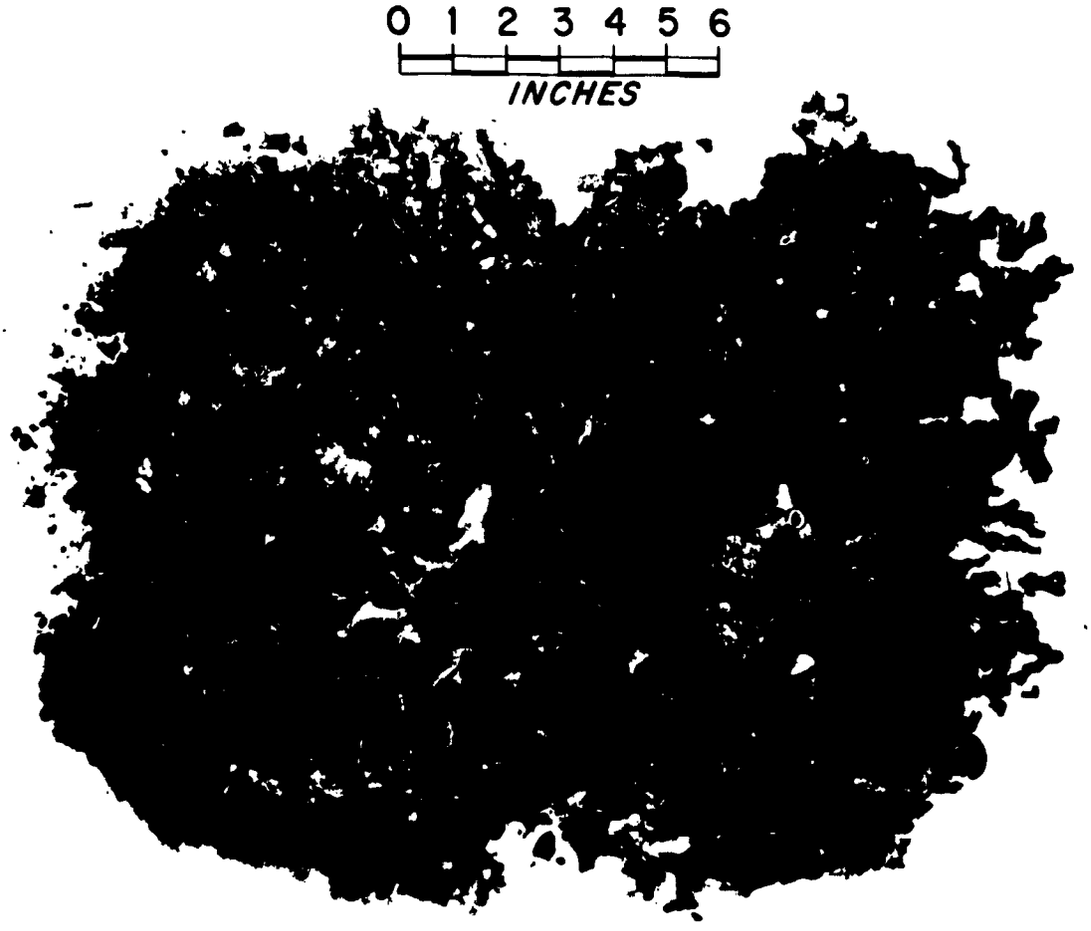
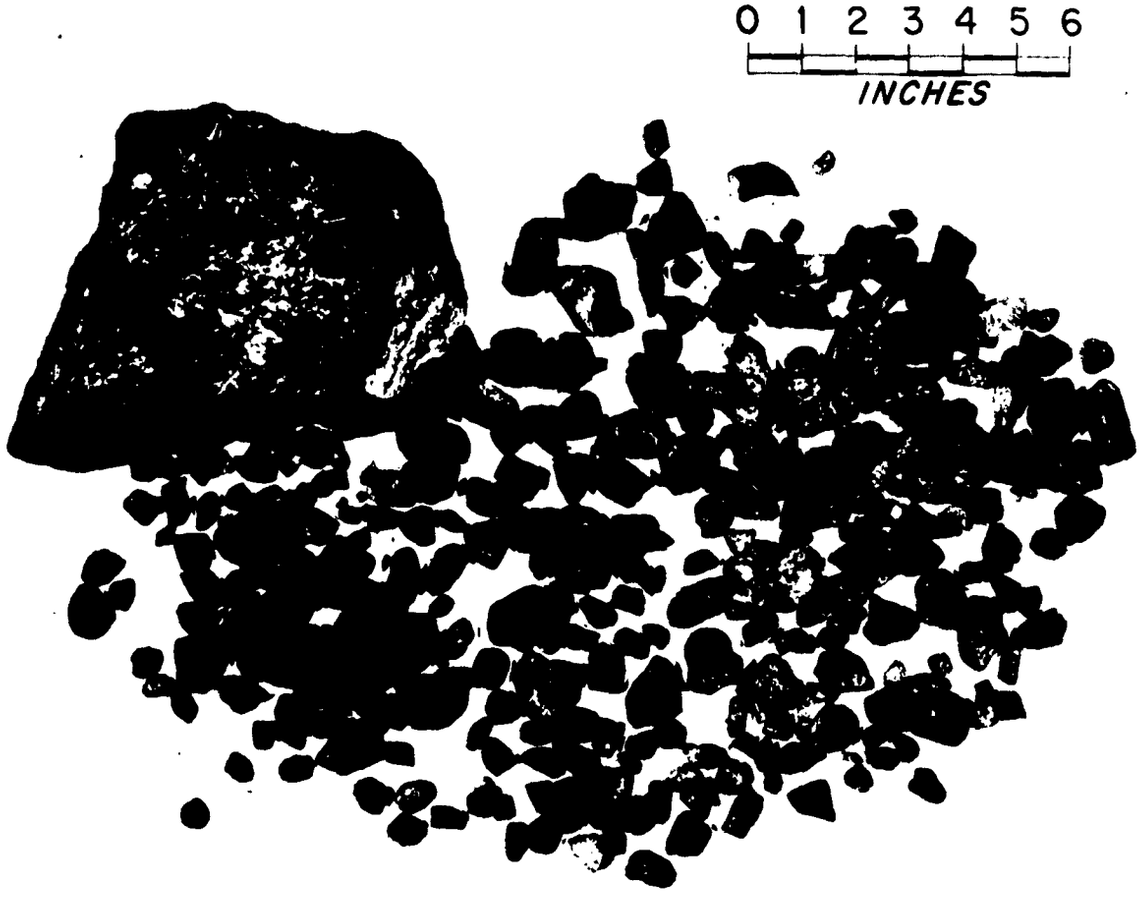


FIGURE VI.



P.D.*16

FIGURE VII.

FIGURE VIII

FIGURE IX.

FIGURE X.

FIGURE XI.

FIGURE XII

FIGURE XIII

FIGURE XIV.

FIGURE XV.

FIGURE XVI

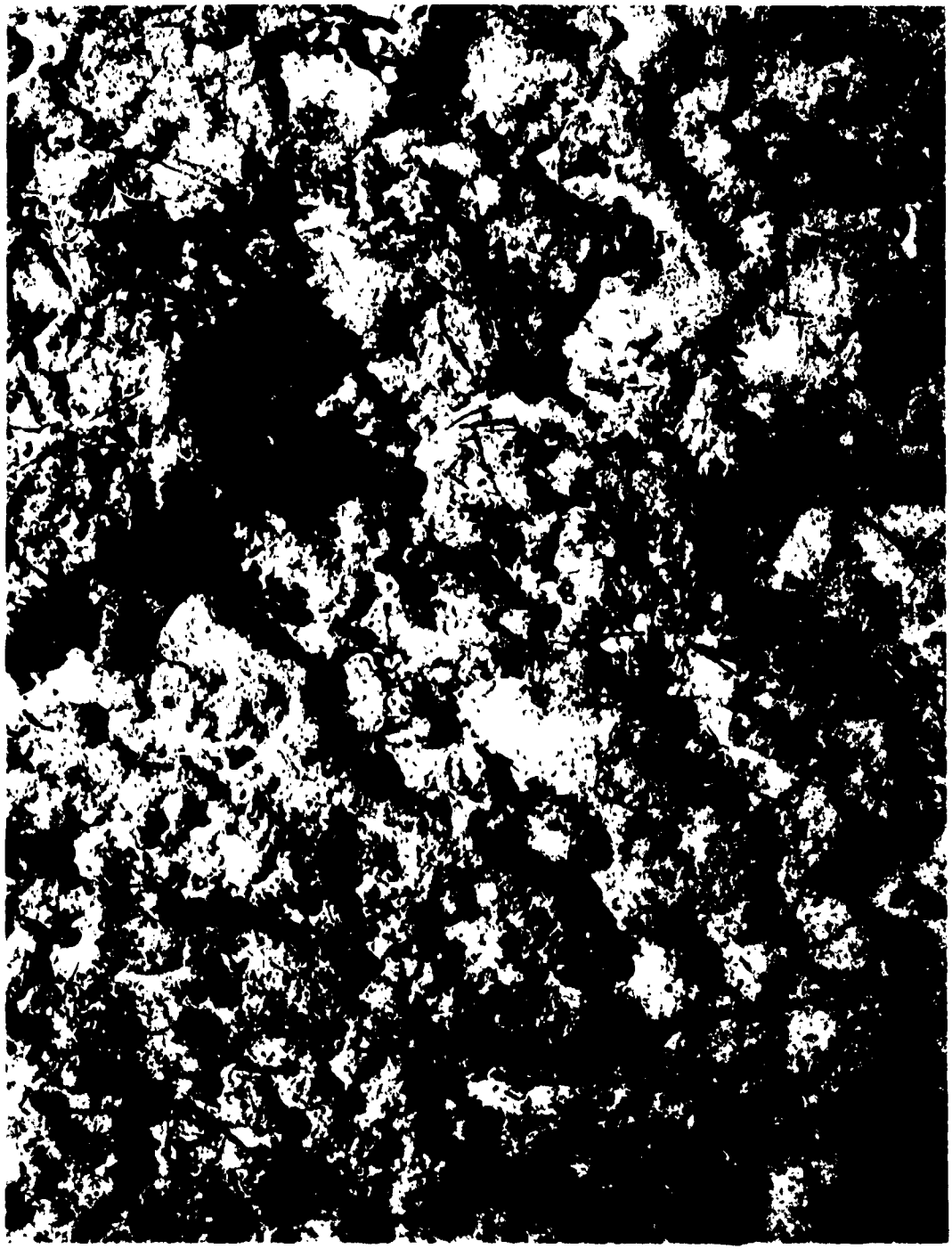


FIGURE XVII.

FIGURE XVIII

FIGURE XIX.

FIGURE XX

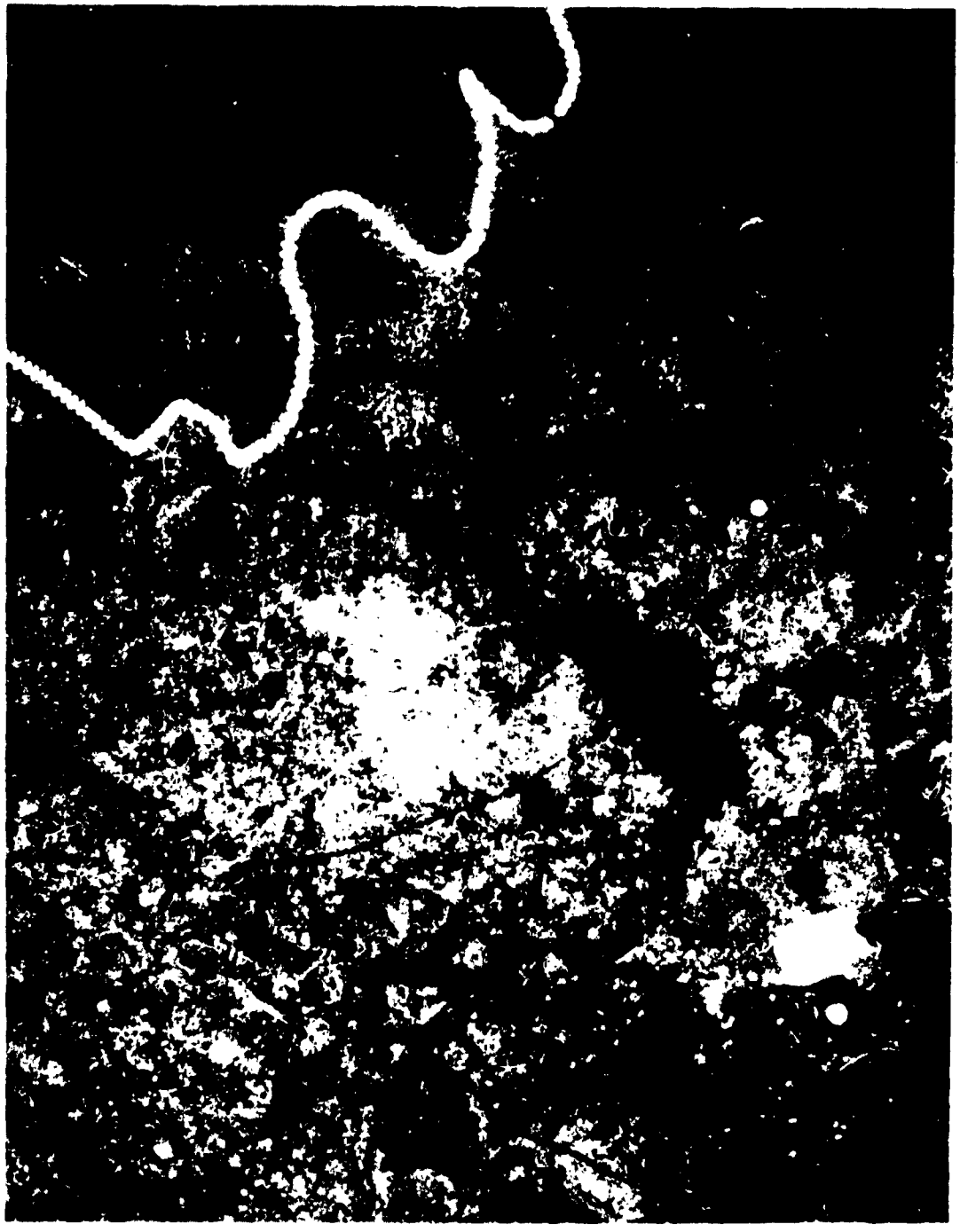


FIGURE XXI

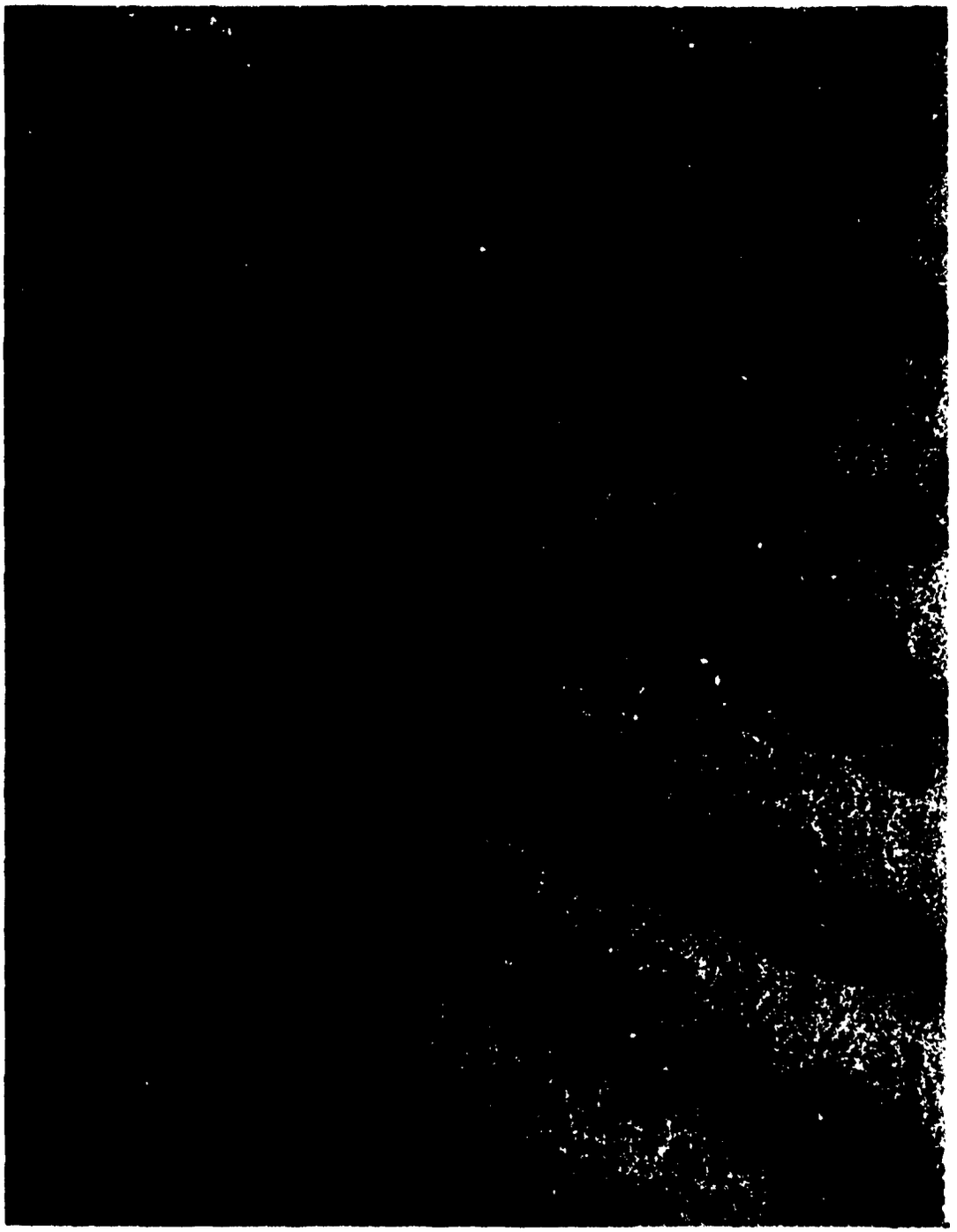


FIGURE XXII.

FIGURE XXIII.

FIGURE XXIV.

FIGURE XXV.

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Reports on ATLANTIS Cruises 260 and 261 to the New England Seamount Chain are combined here. A continuous bathymetric survey was run on both cruises, with profiles across several seamounts. A series of dredge and camera stations were made. They are discussed in this report. Also included are photographs representative of each camera lowering and photographs of dredged material.

1. ATLANTIS Cruises 260 and 261
2. New England Seamounts
3. Bathymetric Survey
4. Geological Observations

1. Richard M. Pratt
2. Stephen L. Thompson

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Report on ATLANTIS Cruises #260-261
June-July, 1962, 18 pp., 26 figs., December 1962.

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Reports on ATLANTIS Cruises 260 and 261 to the New England Seamount Chain are combined here. A continuous bathymetric survey was run on both cruises, with profiles across several seamounts. A series of dredge and camera stations were made. They are discussed in this report. Also included are photographs representative of each camera lowering and photographs of dredged material.

1. ATLANTIS Cruises 260 and 261
2. New England Seamounts
3. Bathymetric Survey
4. Geological Observations

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